ARIZONA DEPARTMENT OF HEALTH SERVICES

BUREAU OF EMERGENCY MEDICAL SERVICES AND TRAUMA SYSTEM

PERFORMANCE IMPROVEMENT TOOLKIT:

CARDIAC ARREST

AZ-PIERS Q3 2013 - Q4 2013

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Report No. 14-2-EMS-OHCA

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Purpose:

The purpose of this report is to provide agencies with a level of comparison on their performance in Out of Hospital Cardiac Arrest (OHCA) cases. This report can be used to support Quality Assurance initiatives in their communities.

This report analyzes four OHCA performance measures:

1. Improve the documentation of bystander CPR,
2. Reduce the time from arrival on scene to initiation of chest compressions,
3. Reduce the time from arrival on scene to defibrillation,
4. Increase the frequency of transports to a cardiac receiving/referral center.

Methodology:

The Arizona Prehospital Information & EMS Registry System (AZ-PIERS) was analyzed to find records where a Cardiac Arrest occurred. The records in this analysis were pulled on May 10, 2014, and had:

1. A unit notified date range of July 1, 2013, to December 31, 2013, AND
2. *Patient Disposition* (E20_10) equal to "Dead on scene," "Treated and Transferred," or "Treated and Transported,"
3. *Procedures* (E19_03), *Protocols* (E17_01), *Prior aid* (E09_01) contains "CPR" or "defibrillation."

The Hospital Discharge Database (HDD) was used to confirm OHCA cases. The hospital admission date matched the range of the unit notified date.

In the HDD, an OHCA was identified as with an ICD-9 code of 427.5. A total of 2,927 OHCA cases were identified in the last two quarters of 2013.

Limitations:

If a patient received care for an OHCA involving more than one submitting EMS agency, that patient would be counted multiple times (once for each EMS agency encounter).

There are three possible reasons for reporting "No/Not Documented":

- The Electronic Patient Care Report (ePCR) vendor failed to transmit the proper code for the data element
- The provider failed to document the procedure
- The provider failed to perform the procedure

Lastly, state benchmarks are restricted to only include those agencies participating in the registry. If your agency is not currently participating please visit us on our AZ-PIERS homepage for information on how to sign up.

A total of 715 Out of Hospital Cardiac Arrest (OHCA) patients were reported in AZ-PIERS.

Males made up 63% of OHCA. The median age of OHCA patients was 66 years. 40% of patients died on scene, 4% were treated and transferred for care, and 54% were treated and transported to a hospital.

Patient Ethnicity (E06_13) was missing in 484 cases.

Table 1: Demographics for OHCA patients

	N	%
Total OHCA patients	715	100%
Age (years)		
Missing	9	1.2%
<45	113	15.8%
45-54	96	13.4%
55-64	117	16.3%
65-74	156	21.8%
75-84	143	20%
≥85	81	11%
Gender		
Missing	16	2.2%
Female	249	34.8%
Male	450	62.9%
Ethnicity		
Missing	484	67.6%
Hispanic or Latino	27	3.7%
Not Hispanic or Latino	204	28.5%
Patient Discharge Status		
Missing	8	1.1%
Dead at Scene	290	40.5%
Treated and transported	390	54.5%
Treated and transferred care	27	3.7%

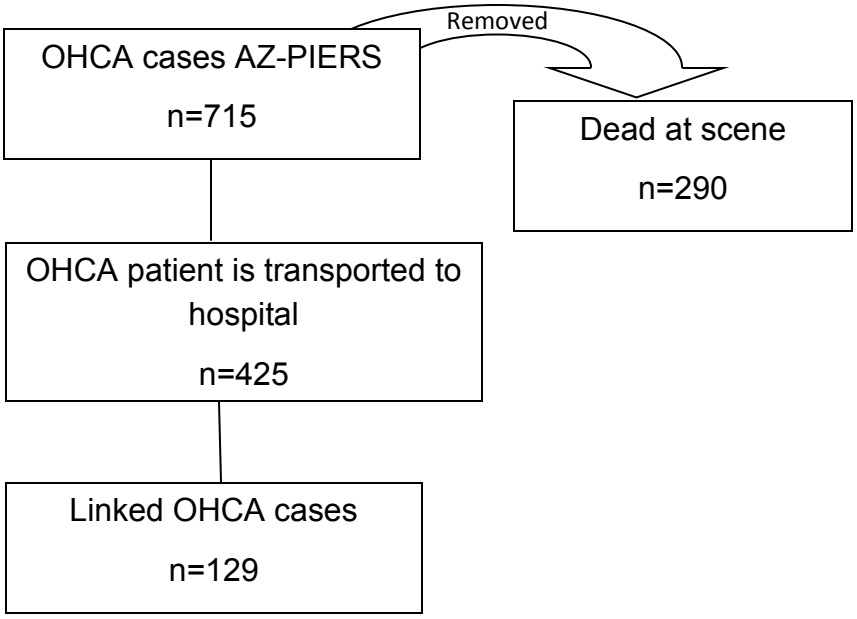
Surviving an OHCA is strongly associated with starting chest compressions as early as possible. The unpredictability and time sensitive nature of an OHCA requires that EMS agencies continue to train their communities in recognizing and rapidly intervening on these patients. Early intervention by the public can lead to an increase in OHCA survival.

The rest of this report focuses on those patients who were transported to a hospital.

Table 2: Documentation of key events in cardiac arrest patients

	N	%
Total OHCA cases transported to hospital	425	100%
Arrest witnessed		
No	194	45.6%
Yes	231	54.3%
Documentation of initial cardiac rhythm		
No	146	34.3%
Yes	279	65.6%
Documentation of ROSC		
No	108	25.4%
Yes	317	74.5%
Documentation of CPR date/time		
No	174	40.9%
Yes	251	59%
Documentation of TOR time		
No	184	43.3%
Yes	241	56.7%

CPR=Cardiopulmonary resuscitation, ROSC=Return of Spontaneous Circulation, TOR= Termination of Resuscitation



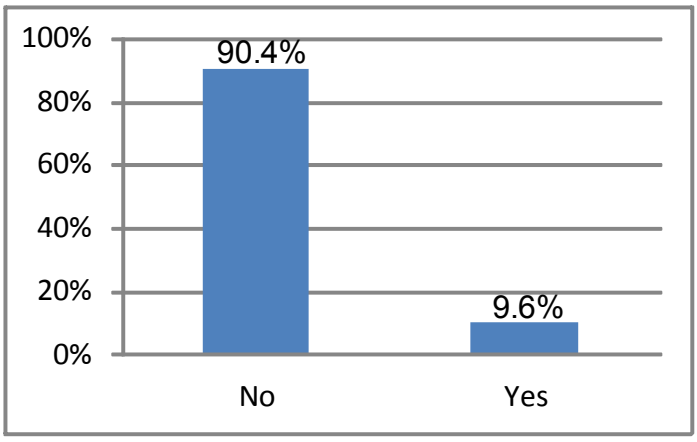
A slight majority of OHCAs were witnessed by a lay person or a health care provider.

Initial cardiac rhythms were documented in 66% of all cases, and ROSC was indicated in 60%.

Time of CPR initiation and Termination of Resuscitation (TOR) was documented in 59% and 57% of cases, respectively.

Performance Measure 1: Improve the documentation of bystander CPR

Graph 1: Bystander CPR performed (n=425)



More than 90% of patients failed to receive bystander CPR. The data elements that were used to calculate bystander CPR were *Prior Aid* (E09_01) and *Prior Aid Performed* By (E09_02).

Nearly 10% of records indicated that bystander CPR was performed on the patient.

Table 3: Procedure performed by EMS (n=425)

	N	%
Procedure-CPR		
Missing	150	35.29%
CPR-Start Compressions and ventilation	139	32.7%
CPR-Start Compressions only without ventilation	134	31.5%
CPR-Start Rescue Breathing without compressions	2	0.47%
Procedure-Defibrillation		
Missing	335	78.8%
Defibrillation-Automated (AED)	9	2.1%
Defibrillation-Manual	81	19%
Procedure-Prior-aid		
Missing	322	75.7%
AED-ERU	1	0.23%
AED-First responder	4	0.94%
AED-Public access	1	0.23%
CPR-Start compressions and ventilation	94	22%
CPR-Start compressions only without ventilation	3	0.7%

EMS performed a variety of procedures on scene. Of the 425 OHCA patients who were transported to the hospital, a quarter of records failed to provide documentation of CPR. Additionally, EMS provided some variation of CPR in 275 times of cases but failed to document/perform CPR in 150 transports.

For more information on training videos for Cardiocerebral Resuscitation (CCR) for EMS providers please visit http:// www.azdhs.gov/azshare/ ccr_share.htm

Performance Measure 2: Reduce the time from arrival on scene to initiation of chest compressions

Graph 2: Time interval in minutes from arrival on scene to chest compressions (n=59)

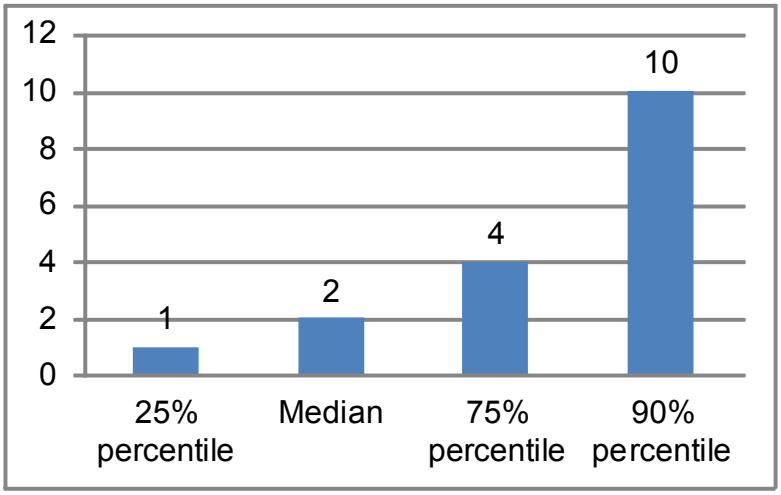


Table 4: Time interval in minutes from arrival on scene to chest compressions (n=59)

Documented	Not documented	25th percentile	Median	75th percentile	90th percentile
242	183	1	2.0	4	10

Of the 242 records, the time to first compression was missing in 75% of the cases. The median time from arrival on scene to the initiation of chest compressions was 2 minutes.

The time interval was calculated through *Unit Arrived on Scene* (E05_06) or *Date/Time Procedures Performed Successfully* (E19_01). A *Unit Arrived on Scene* time (E05_06) is defined as the time the vehicle stopped moving.

Performance Measure 3: Reduce the time from arrival on scene to defibrillation

Graph 3: Time interval (minutes) from arrival on scene to defibrillation (n=80)

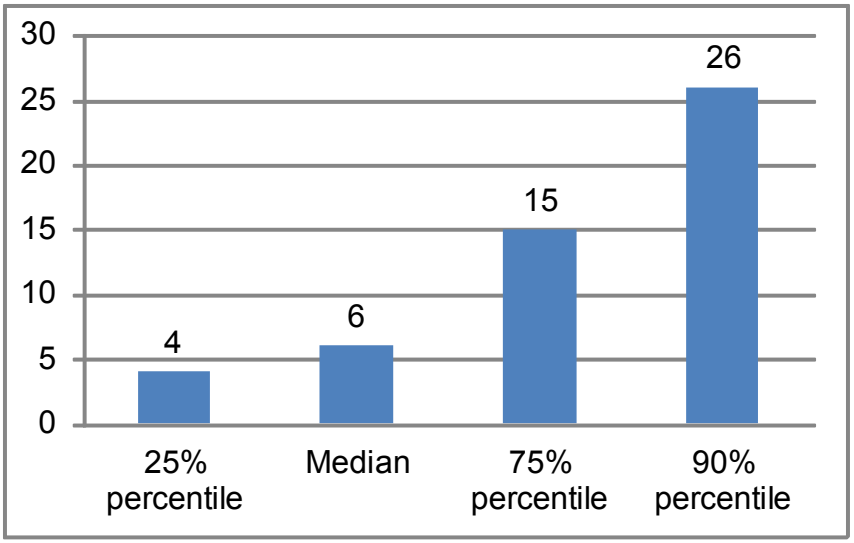


Table 5: Time interval from arrival on scene to defibrillation

Documented	Not documented	25% percentile	Median	75% percentile	90% percentile
80	345	4	6.0	15	26

Statewide, AZ-PIERS reported 80 cases in which an AED was used. In the cases where AED utilization was reported, the median time was 6 minutes after a unit arrived on scene.

The time interval was calculated through for *Unit Arrived on Scene* (E05_06), *Procedures* (E19_03), and *Date/Time Procedures Performed Successfully* (E19_01). The *Unit Arrived on Scene* time (E05_06) is defined as the time the vehicle stopped moving.

There are three scenarios that can occur in reporting a "No/Not Documented" for procedures:

- The ePCR vendor failed to properly map *Procedure* (E19_03)
- The provider failed to document the procedure
- The provider failed to perform the procedure

Proper documentation informs other providers of important clinical observations, enhances legal protection for EMCTs, and drives systems of care and resource allocation.

Performance Measure 4: Increase the frequency of transports to a cardiac receiving/referral center

Graph 4: Hospital destination for OHCA patients (n=390)

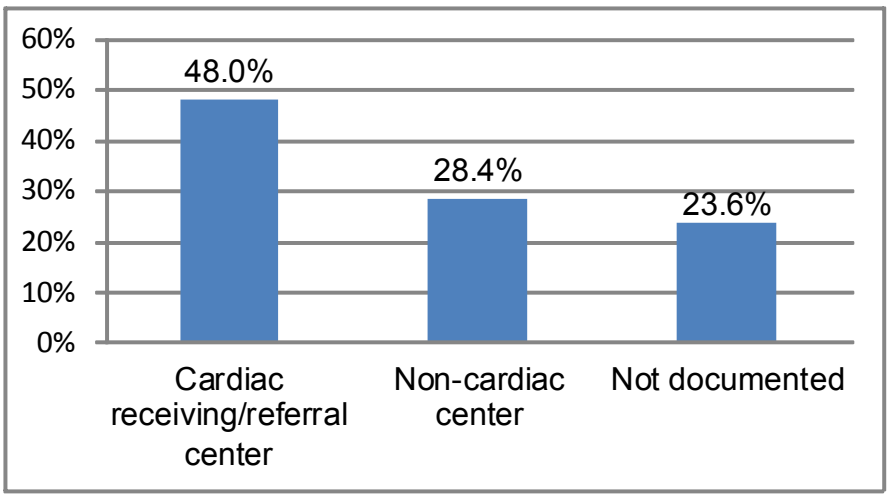


Table 6: Hospital destination for OHCA patients

	N	%
Total treated and transported	390	100%
Cardiac receiving/referral center	191	48.9%
Non-cardiac center	113	28.9%
Not documented	86	22%

Patients who had 'Treated and Transported' were additionally categorized into the hospital's recognition for cardiac care.

Of these patients, 49% were transported to a Cardiac Receiving Center (CRC). A portion of records (22%) had no destination hospital information available.

There are two scenarios that can occur in reporting a "No/Not Documented" for *Hospital Destination* (E20_01):

- The ePCR vendor failed to properly map *Procedure* (E19_03)
- The provider failed to document the hospital destination

Table 7: Linked OHCA cases to HDD

AZPIERS linked to HDD	N	%
Total OHCA cases transported to hospital	425	100%
Total AZPIERS cases linked to HDD	129	30.3%
Cases not linked	296	69.6%

Patients who met the OHCA inclusion criteria were linked to the HDD through:

- *Unit Notified By Dispatch Date/Time* (E05_04) matched patient arrival date,
- *Patient Last Name* (E06_01) and *Patient First Name* and (E06_02), *Patient Gender* (E6_11),
- *Date of Birth* (E06_16).

Accuracy in these fields by EMS agencies and hospitals results in a more successful "link" that allows for systemic improvements in patient care.

Table 8: Discharge status of linked cases

Hospital discharge status	N	%
Total linked cases	129	100%
Home	6	4.6%
Transferred to Acute Care	1	0.77%
ALF/Rehab/SNF/ Long Term	1	0.77%
Expired	117	90.7%
Hospice	4	3.1%

ALF=Assisted Living Facility, SNF=Skilled Nursing Facility

Of the 129 cases, a vast majority of patient died as a result of their OHCA (94%). There are various strategies Arizona has initiated to improve survival for OHCA.

- Training the public: http://www.youtube.com/watch?v=EcbgpiKyUbs
- Training providers and dispatch:
  - http://www.azdhs.gov/azshare/Info4EMSProviders.htm
  - http://www.azdhs.gov/azshare/911/index.htm